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10/820,770

04/09/2004

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EXAMINER

HOANG, QUOC DINH

ART UNIT

PAPER NUMBER

2892

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DELIVERY MODE

07/25/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/820,770 | Applicant(s) KOIWA, ICHIRO | |
| | Examiner QUOC D. HOANG | Art Unit 2892 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-8, 15 and 18-27 is/are pending in the application.
- 4a) Of the above claim(s) 4-6, 19-22 and 24-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2, 3, 7, 8, 15, 18, 23 and 27 is/are rejected.
- 7) ☒ Claim(s) 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Amendment filed on 04/04/2008 has been entered. Claims 1, 9-14, 16, 17 have been canceled. Claims 4-6, 19-22 and 24-27 have been withdrawn from consideration as non-elected claims. Claims 2-8, 15, and 18-27 are pending in the application.

Claim Objections

2. Claim 15 is objected to because of the following informalities: line 9, "second planar electrode" should read -- first planar electrode --. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 7, 8, 15, 18, 23 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., (US Pat No. 6,033,953) (hereinafter "Aoki") in view of Lu., (US Pat No. 5,679,596).

Regarding claim 2, Aoki teaches a ferroelectric capacitor comprising:

a stepped bottom electrode having a planar base electrode (38) with a plurality of projection electrodes (convex parts 38a) on the planar base electrode (col. 1, lines 14-57 and Fig. 14);

a ferroelectric layer (40) on the bottom electrode and the projection electrodes (col. 1, lines 14-57 and Fig. 14); and

a top planar electrode (37) formed on the ferroelectric layer, wherein a thickness of the ferroelectric layer on the projection electrodes is less than a thickness of the ferroelectric layer on the planar base electrode (col. 1, lines 14-57 and Fig. 14).

Aoki teaches a plurality of projection electrodes, but fails to teach wherein spacing between central portions of each projection electrode has a range from 10 % to 20% of a size of the ferroelectric capacitor.

However, Lu teaches wherein spacing between central portions of each projection electrode (14b) has a range from 1.5 % to 75% of a size of the ferroelectric capacitor (col. 4, line 50 through col. 5, line 65 and Fig. 5). *It is noted that the size of the ferroelectric capacitor is considered the width (2,000-10,000 Å) of the bottom electrode 11 (col. 4, lines 40-43), the width of the projection electrode 14b is between about 50-500 Å (col. 5, lines 17-18), and the spaces 14a between the projection electrode 14b are between about 100-1000 Å (col. 5, lines 19-21). Hence, after calculating, the spacing between central portions of each projection electrode 14b has a range from 1.5 % to 75% of a size of the ferroelectric capacitor.* Since Aoki and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Aoki. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide spacing between central portions of each projection electrode in order to increase the surface area of the bottom electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines

24 through col. 6, line 3. Although Lu's percentage range (1.5 % to 75%) is not the claimed range (10 % to 20%), this does not define patentable over Aoki in view of Lu since it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 3, Aoki teaches a ferroelectric capacitor comprising:

a stepped bottom electrode having a planar base electrode (38) with a plurality of projection electrodes (convex parts 38a) on the planar base electrode (col. 1, lines 14-57 and Fig. 14);

a ferroelectric layer (40) formed on the bottom electrode and the projection electrodes (col. 1, lines 14-57 and Fig. 14); and

a top planar electrode (37) on the ferroelectric layer, wherein a thickness of the ferroelectric layer on the projection electrodes is less than a thickness of the ferroelectric layer on the planar base electrode (col. 1, lines 14-57 and Fig. 14).

Aoki teaches a plurality of projection electrodes, but fails to teach wherein wherein a size of each projection electrode has a range from 5 % to 10% of a size of the ferroelectric capacitor.

However, Lu teaches wherein a size of each projection electrode (14b) has a range from 0.5 % to 25% of a size of the ferroelectric capacitor (col. 4, line 50 through col. 5, line 65 and Fig. 5). *It is noted that the size of the ferroelectric capacitor is considered the width (2,000-10,000 Å) of the bottom electrode 11 (col. 4, lines 40-43), the size of each projection electrode is considered the width of the projection electrode*

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14b, which is between about 50-500 Å (col. 5, lines 17-18). Hence, after calculating, a size of each projection electrode has a range from 0.5 % to 25% of a size of the ferroelectric capacitor. Since Aoki and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Aoki. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide a size of each projection electrode has a range from 5 % to 10% of a size of the ferroelectric capacitor in order to increase the surface area of the bottom electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines 24 through col. 6, line 3. Although Lu's percentage range (0.5 % to 25%) is not the claimed range (5 % to 10%), this does not define patentable over Aoki in view of Lu since it has been held where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 7, Aoki teaches a ferroelectric capacitor comprising:

a stepped bottom electrode having a planar base electrode (38) with a plurality of projection electrodes (convex parts 38a) on the planar base electrode (col. 1, lines 14-57 and Fig. 14);

a ferroelectric layer (40) on the stepped bottom electrode and the projection electrodes (col. 1, lines 14-57 and Fig. 14); and

a top planar electrode (37) on the ferroelectric layer, wherein a thickness of the ferroelectric layer on the projection electrodes is less than a thickness of the ferroelectric layer on the planar base electrode (col. 1, lines 14-57 and Fig. 14).

Aoki teaches a plurality of projection electrodes, but fails to teach wherein the projection electrodes are arranged evenly spaced on the bottom electrode.

However, Lu teaches wherein the projection electrodes (14b) are arranged evenly spaced on the bottom electrode 11 (col. 4, line 50 through col. 5, line 65 and Fig. 5). *It is noted that the evenly spaced between the projection electrodes 14b is the width of the crevice or space 14a (col. 5, lines 19-21).* Since Aoki and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Aoki. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide evenly spaced between the projection electrodes in order to increase the surface area of the bottom electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines 24 through col. 6, line 3. Also, the limitations “so that cores of polarization inversion within the ferroelectric layer extend from the projection electrodes” is considered an intended use of the claimed invention. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Regarding claim 8, Aoki teaches wherein the planar base electrode 38 and the projection electrodes 38a are made of a same material (platinum) (col. 1, lines 50-55 and Fig. 14).

Regarding claim 15, Aoki teaches a ferroelectric capacitor comprising:

a first stepped electrode comprising a first planar base electrode (38) having a plurality of projection electrodes (convex parts 38a) on the planar base electrode (col. 1, lines 14-57 and Fig. 14);

a second planar electrode (37); and

a ferroelectric layer (40) sandwiched between the first stepped electrode and the second planar electrode (col. 1, lines 14-57 and Fig. 14) wherein a thickness of the ferroelectric layer on the projection electrodes is less than a thickness of the ferroelectric layer on the first planar electrode (col. 1, lines 14-57 and Fig. 14).

Aoki teaches a plurality of third electrodes, but fails to teach wherein the third electrodes are arranged evenly spaced.

However, Lu teaches wherein the third electrodes (14b) are arranged evenly spaced (col. 4, line 50 through col. 5, line 65 and Fig. 5). *It is noted that the evenly spaced between the projection electrodes 14b is the width of the crevice or space 14a (col. 5, lines 19-21).* Since Aoki and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Aoki. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide evenly spaced between the third electrodes in order to increase the surface area of the first electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines 24 through col. 6, line 3. Also, the limitations "so that cores of polarization inversion within the ferroelectric layer extend from the third electrodes" is considered an intended use of the claimed invention. A recitation of the intended use of the claimed invention must result in a structural

difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Regarding claim 18, Aoki teaches wherein the first electrode (38) and the third electrodes (38a) are made of a same material (platinum) (col. 1, lines 50-55 and Fig. 14).

Regarding claim 23, Aoki teaches wherein the bottom electrode 38 and the projection electrodes 38a are made of a same material (platinum) (col. 1, lines 50-55 and Fig. 14).

Regarding claim 27, Aoki teaches wherein the bottom electrode 38 and the projection electrodes 38a are made of a same material (platinum) (col. 1, lines 50-55 and Fig. 14).

Response to Arguments

5. Applicant's arguments filed 04/04/2008 have been fully considered but they are not persuasive.

In response to applicant's argument on pages 9-10 that motivation for modifying the structure in Fig. 14 of the Aoki et al. reference in view of Figs. 5-7 of the Lu reference, the combined teaching would not meet the features of claim 1, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

In response to applicant's argument on page 10 that the structure in Fig. 14 of the Aoki et al. reference as modified in view of the Lu reference would not include a top planar electrode on a ferroelectric layer, wherein a thickness of the ferroelectric layer on the projection electrodes would be less than a thickness of the ferroelectric layer on a planar base electrode. The Examiner respectfully submits that as depicted in figure 14, Aoki shows that the thickness of the ferroelectric layer (40) on the projection electrodes (38a) would be less than a thickness of the ferroelectric layer on a planar base electrode (38).

In response to applicant's argument on page 11 that no motivation to modify a method of forming a platinum capacitor electrode as by sputtering or vapor deposition as disclosed in the Aoki et al. reference, using a method of forming a polysilicon capacitor electrode having pillars formed by spot deposited polysilicon as disclosed in the Lu reference, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

6. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quoc Hoang whose telephone number is (571) 272-1780. The examiner can normally be reached on Monday-Friday from 8.00 AM to 5.00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao Le can be reached on (571) 272-1708. The fax phone numbers of the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Quoc D Hoang/

Primary Examiner, Art Unit 2892

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